Claims

WHAT IS CLAIMED IS:

1. An applicator for delivering targeted radiation brachytherapy to tissue adjacent a cavity of a patient, said applicator comprising:

a balloon adapted for introduction to the cavity of the patient, said balloon having a deflated state in which the balloon is adapted for insertion into the cavity and an inflated state in which the balloon is enlarged for at least partially filling the cavity of the patient, said balloon moving from said deflated state to the inflated state upon introduction of pressurized fluid to an interior of the balloon;

a conduit in fluid communication with the interior of the balloon for introducing pressurized fluid to the interior of the balloon to move the balloon from the deflated state to the inflated state; and

a catheter extending over at least a portion of the balloon for delivering radiation from a radiation source to the tissue adjacent the cavity.

2. An applicator in accordance with claim 1 wherein the catheter extends through the conduit and along an interior surface of the balloon.

3. An applicator in accordance with claim 1 wherein the balloon is generally cylindrical when the balloon is in the inflated state.

4. An applicator in accordance with claim 1 wherein the balloon is generally spherical when the balloon is in the inflated state.

5. An applicator in accordance with claim 1 wherein the conduit is at least partially transparent.

6. An applicator in accordance with claim 1 wherein the conduit is a first conduit, the balloon is a first balloon, and the applicator further comprises:

a second balloon adjacent the first balloon, said second balloon being adapted for introduction to the cavity of the patient simultaneous with the first balloon, said second balloon having a deflated state in which the second balloon is adapted for insertion into the cavity and an inflated state in which the second balloon is enlarged for at least partially filling the cavity of the patient, said second balloon moving from the deflated state to the inflated state upon introduction of pressurized fluid to an interior of the second balloon; and

a second conduit in fluid communication with the interior of the second balloon for introducing pressurized fluid to the interior of the second balloon to move the second balloon from the deflated state to the inflated state.

7. An applicator in accordance with claim 6 wherein the second balloon surrounds the first balloon.

8. An applicator in accordance with claim 1 wherein the radiation source comprises a radioactive seed attached to a wire positioned in the catheter such that the seed is generally adjacent the balloon.

9. An applicator in accordance with claim 8 wherein the balloon is at least partially transparent, and said applicator further comprises a viewing apparatus generally adjacent the balloon for viewing the catheter and the tissue adjacent the cavity.

10. . An applicator system for delivering targeted thermal therapy to tissue adjacent a cavity of a patient, said applicator system comprising:

a balloon adapted for introduction to the cavity of the patient, said balloon having a deflated state in which the balloon is adapted for insertion into the cavity and an inflated state in which the balloon is enlarged for at least partially filling the cavity of the patient, said balloon moving from the deflated state to the inflated state upon introduction of pressurized fluid to an interior of the balloon;

a conduit in fluid communication with the interior of the balloon for introducing pressurized fluid to the interior of the balloon to move the balloon from the deflated state to the inflated state; and

a catheter extending over at least a portion of the balloon, said conduit having a heat source therein for delivering heat to the tissue adjacent the cavity.

11. An applicator system in accordance with claim 10 wherein the heat source comprises an antenna configured to emit microwaves into the tissue adjacent the cavity thereby to heat the tissue.

12. An applicator system in accordance with claim 11 wherein the antenna is a helical antenna.

13. An applicator system in accordance with claim 10 wherein the balloon is generally transparent, and said applicator system further comprises a viewing apparatus generally adjacent the balloon for viewing the catheter and the tissue adjacent the cavity.

14. An applicator system in accordance with claim 10 wherein the conduit is a first conduit, the balloon is a first balloon, and said applicator system further comprises:

a second balloon adjacent the first balloon, said second balloon being adapted for introduction to the cavity of the patient simultaneous with the first balloon, said second balloon having a deflated state in which the second balloon is adapted for insertion into the cavity and an inflated state in which the second balloon is enlarged for at least partially filling the cavity of the patient, said second balloon moving from the deflated state to the inflated state upon introduction of pressurized fluid to an interior of the second balloon; and

a second conduit in fluid communication with the interior of the second balloon for introducing pressurized fluid to the interior of the second balloon to move the second balloon from the deflated state to the inflated state.

15. A method of delivering targeted radiation brachytherapy to tissue adjacent a cavity of a patient using an applicator comprising a balloon having a deflated state in which the balloon is adapted for insertion into the cavity of the patient and an inflated state in which the balloon is enlarged for at least partially filling the cavity, said method comprising:

attaching a catheter to the balloon for movement with the balloon;

inserting the balloon and the catheter into the cavity when the balloon is in the deflated state;

inserting a radiation source into the catheter so the radiation source is generally adjacent the balloon;

inflating the balloon within the cavity so the radiation source is a predetermined distance from the tissue adjacent the cavity; and

controlling a dose distribution of radiation delivered into the tissue adjacent the cavity by the radiation source by controlling the predetermined distance of the radiation source from the tissue.

16. A method in accordance with claim 15 further comprising rotating the balloon within the cavity to further control the dose distribution of radiation delivered into the tissue by the radiation source.

17. A method in accordance with claim 15 wherein the balloon is a first balloon, the applicator further comprises a second balloon adjacent the first balloon, the second balloon has a deflated state in which the second balloon is adapted for insertion into the cavity of the patient and an inflated state in which the second balloon is enlarged for at least partially filling the cavity, said step of inserting the balloon and the catheter into the cavity when the balloon is in the deflated state comprises inserting the second balloon into the cavity simultaneously with the first balloon when the second balloon is in the deflated state, and said step of inflating the balloon within the cavity comprises inflating the second balloon so the second balloon at least partially fills the cavity.

18. A method of delivering targeted thermal therapy to tissue adjacent a cavity of a patient using an applicator comprising a balloon having a deflated state in which the balloon is adapted for insertion into the cavity of the patient and an inflated state in which the balloon is enlarged for at least partially filling the cavity, said method comprising:

attaching a catheter to the balloon for movement with the balloon;

inserting the balloon and the catheter into the cavity when the balloon is in the deflated state;

inserting a heat source into the catheter so the heat source is generally adjacent the balloon;

inflating the balloon within the cavity so the heat source is a predetermined distance from the tissue adjacent the cavity; and

controlling a temperature increase of the tissue adjacent the cavity by controlling the predetermined distance of the heat source from the tissue.

19. A method in accordance with claim 18 further comprising rotating the balloon within the cavity to further control the temperature increase of the tissue.

20. A method in accordance with claim 19 wherein the balloon is a first balloon, the applicator further comprises a second balloon adjacent the first balloon, the second balloon has a deflated state in which the second balloon is adapted for insertion into the cavity of the patient and an inflated state in which the second balloon is enlarged for at least partially filling the cavity, said step of inserting the balloon and the catheter into the cavity when the balloon is in the deflated state comprises inserting the second balloon into the cavity simultaneously with the first balloon when the second balloon is in the deflated state, and said step of inflating the balloon within the cavity comprises inflating the second balloon so the second balloon at least partially fills the cavity.

21. An applicator system for facilitating the delivery of at least one of external beam radiation and external thermal therapy to tissue adjacent a cavity of a patient, said applicator system comprising:

a balloon adapted for introduction to the cavity of the patient, said balloon having a deflated state in which the balloon is adapted for insertion into the cavity and an inflated state in which the balloon is enlarged for at least partially filling the cavity of the patient, said balloon moving from the deflated state to the inflated state upon introduction of pressurized fluid to an interior of the balloon;

a conduit in fluid communication with the interior of the balloon for introducing pressurized fluid to the interior of the balloon to move the balloon from the deflated state to the inflated state; and

a catheter extending over at least a portion of the balloon, said catheter having a radio opaque marker therein adjacent the balloon for marking a position of the balloon when the balloon is received within the cavity.